

November 1, 2005

**HAND DELIVERY**

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California Public Utilities Commission  
505 Van Ness Avenue, Room 2001  
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Re: Pacific Gas and Electric Company (U 39 E), for Approval of the 2006-2008 Energy Efficiency Programs and Budget { A.05-06-004; A.05-06-011; A.05-06-015, and A.05-06-016 are consolidated by a June 8, 2005 Ruling }

Enclosed for the filing in the above-captioned matter are an original and (5) copies of:

**JOINT UTILITY REPORT SUMMARIZING WORKSHOPS ON  
AVOIDED COSTS INPUTS AND THE E3 CALCULATOR**

Please file original document, date-stamp a copy, and return the endorsed copy in the stamped, self-addressed envelope provided for this purpose.

Very truly yours,

/s/

Chonda J. Nwamu

CJN/pak

cc: Meg Gottstein, ALJ  
Susan P. Kennedy, Commissioner  
Tim Drew, ED  
All Parties on Service List R.01-08-028, A.05-06-004 et al

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Pacific Gas and Electric Company (U 39-E), for approval of the 2006 – 2008 Energy Efficiency Programs and Budget. [A.05-06-004, A.05-06-011, A.05-06-015, and A.05-06-016 are consolidated by a June 8, 2005 ruling.]	Application 05-06-004 (Filed June 1, 2005)
Southern California Gas Company (U 904-G) for Approval of Natural Gas Energy Efficiency Programs and Budgets for Years 2006 through 2008.	Application 05-06-011 (Filed June 1, 2005)
Southern California Edison Company (U 338-E), for Approval of its 2006 – 2008 Energy Efficiency Program Plans and associated Public Goods Charge (PGC) and Procurement Funding Requests.	Application 05-06-015 (Filed June 2, 2005)
San Diego Gas & Electric Company (U 902-E) for Approval of Electric and Natural Gas Energy Efficiency Programs and Budgets for Years 2006 through 2008.	Application 05-06-016 (Filed June 2, 2005)

**JOINT UTILITY REPORT SUMMARIZING WORKSHOPS  
ON AVOIDED COSTS INPUTS AND THE E3 CALCULATOR**

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**JOINT UTILITY REPORT SUMMARIZING  
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E3 CALCULATOR**

**1. INTRODUCTION**

The Interim Opinion on Energy Efficiency Portfolio Plans and Program Funding Levels for 2006-2008 – Phase 1 Issues (Decision 05-09-043) required the utilities to hold workshops on the avoided cost inputs and the E3 calculator and file a report on those workshops by November 1, 2005. This report fulfills that requirement.

Relevant sections from Decision 05-09-043 are excerpted below.

...the utilities should meet with interested parties to discuss all the cost-effectiveness inputs in the E3 calculators, as suggested in their comments. This meeting should be held by the utilities, led by the E3 consultant that developed the calculators under contract to them, within 15 days from the effective date of this decision. [D. 05-09-043, p. 110]

There will clearly be continued disagreements over what elements of the E3 calculator model, underlying load shape data and avoided cost “mapping” approaches (in addition

to the peak demand definitional issues) need to be revised for the future. This workshop is not the forum for debating or resolving these disagreements. Rather, its primary purpose is informational. However, we expect that the discussions will also help Joint Staff and interested parties begin to identify what issues should be addressed during the post-compliance phase updating process, described further in Section 8.8 below. [D.05-09-043, p. 111]

Another purpose of the workshop discussion will be to identify any E3 calculator (model or input) “fixes” that are relatively easy to implement and where there is general consensus that such modifications are appropriate. [D.05-09-043, p. 111]

After the informational portion of the workshop is concluded, workshop participants should engage in discussions on what improvements can be made relatively quickly to the E3 calculator model. The utilities are authorized to make further refinements to the E3 calculators based on the feedback that they receive during the workshop, and are directed to describe those changes in the November 1 filing discussed below. [D. 05-09-043, p. 112]

By November 1, 2005, the utilities shall file a report summarizing the workshop discussion and reporting the E3 calculator refinements that they have made in response. Based on the workshop discussion, the report should also present a preliminary list of issues that participants recommend be addressed during the updating process described in Section 8.8. The report should also present the workshop discussion on the data collection needs discussed above. The utilities are encouraged to hold additional workshops in October, as time permits, to further discuss the data collection and longer term updating issues with their PRGs and interested parties before preparing their report. The Assigned Commissioner or ALJ will solicit written comments on the final report to assist in scoping the issues for the 2006 updating process. [D. 05-09-043, p. 113]

## **2. WORKSHOP BACKGROUND**

Two workshops related to avoided costs and the E3 calculator were held during the first week of October. The first workshop was held at the PG&E Pacific Energy Center on October 3, 2005. The workshop was attended by representatives from E3, PG&E, SDG&E, SoCalGas, SCE, CPUC Energy Division, Office of Ratepayer Advocates (ORA), TURN, ICF Consulting, Intergy, City and County of San Francisco (CCSF), Quantum Consulting, JJ Hirsch and Associates, Freeman Sullivan and Co., and ALJ Gottstein. The meeting audio was also shared via a conference call center, and the meeting presentations were webcast over the internet via the Genesys conferencing system.

The primary goal of the October 3<sup>rd</sup> meeting was to provide background information to parties about the adopted energy efficiency avoided costs used in the E3 calculator, and to educate parties about how those avoided costs are combined with utility end use load shapes for program evaluation. E3’s Snuller Price and Brian Horii provided PowerPoint presentations on these points. Jennifer Barnes of PG&E and the DEER consultant Jeff Hirsch also provided a brief

discussion of the DEER database and ongoing end use shape research.

The second workshop was held on October 4<sup>th</sup> at the CPUC building in San Francisco. The same organizations were represented in the room, except for Quantum Consulting, Freeman Sullivan and Co., CCSF, and JJ Hirsch Associates. The meeting audio was available via conference call, although a call-in number problem prevented access to a portion of the morning discussions.

The goals of the second workshop were to 1) engage in discussions on what improvements can be made relatively quickly to the E3 calculator model, 2) discuss data collection needs for load mapping the peak demand determination, and 3) develop preliminary list of issues that participants recommend be addressed during the updating process described in Section 8.8 of D.05-09-043.

### **3. WORKSHOP SUMMARY**

This section provides a summary of the relevant discussions at the October 3<sup>rd</sup> and 4<sup>th</sup> workshops. As many of the topics were discussed on both days, this section is organized by topic, rather than by the agenda order of the workshops. The content of the presentations made during the workshops is repeated only to the extent that it is relevant to a topic. Copies of the presentations and workshop agenda are posted at: [http://www.ethree.com/cpuc\\_ee\\_tools.html](http://www.ethree.com/cpuc_ee_tools.html).

#### **3.1 Available Load Information**

There were extensive discussions about the available IOU load shapes used in each IOU's E3 calculators, and whether these load shapes were the most appropriate to use for energy efficiency program evaluation. Jeff Hirsch pointed out that building end use shapes may not be the same as impact shapes. Impact shapes are the difference between the energy consumption patterns of the "standard" end use measures and the energy efficient end use measures. If an energy efficiency device reduces consumption in a fixed proportion to the standard measure, then the impact and end use shape would be the same. Otherwise the impact shape and end use shape would differ. It was also pointed out that there are differences between impact load shapes, energy load shapes, demand load shapes. PG&E acknowledged that its hourly load shapes are end use shapes, not impact shapes. SCE stated that it believes that its Time-of-Use (TOU) period shapes are impact shapes. PG&E believes that its TOU shapes are also impact shapes, though PG&E could not confirm because of the lack of supporting documentation and absence of organizational memory regarding the development of the TOU shapes. PG&E also pointed out that there are variations among programs – for example, impact load shapes are generated in the Savings by Design new construction program using T-24 runs. Finally, for all IOUs, the TOU load shapes have been consistently used in the utilities' historical program planning. ALJ Gottstein encouraged the utilities to hold additional workshops to further identify load shape issues.

#### **3.2 Peak kW Definition**

Parties recognized the desirability of a consistent definition of peak kW, but also recognized that attaining such a metric is unattainable at the current time. The IOUs currently have peak kW

reduction information for their ratemaking TOU periods. PG&E also has a coincident peak kW measure, but that is only available for their subset of shapes based that use the hourly building end use shapes. Unfortunately, each utility's definition of the summer months differs, and the hours of the day included in the peak period also differ between SDG&E and the other two IOUs. Parties agreed that the peak period definition could not be unified in the near term. In addition, parties indicated that the EE proceeding may not be the appropriate venue for developing a definition as it would affect many other parties. PG&E recommended that the definition be developed in the Avoided Cost proceeding.

It was agreed that utilities should present 1) summer peak kW reductions based on their load shape information, and 2) user entered kW estimates that would largely be based upon DEER kW estimates. It was also agreed that CEC kW would still be reported in the E3 calculator, but de-emphasized. TURN in particular, stressed that summer peak kW reductions should be reported, rather than the CEC kW.

Parties also suggested that the ISO should be consulted on a meaningful metric, and that Qualifying Facilities should be considered as well.

Parties recognized that the issue of the peak kW definition would not be decided in the workshops, but some discussion of peak demand definitions was pursued in the workshops.

Antonio Alvarez of PG&E provided a discussion of how energy efficiency's demand reduction contributions to Resource Adequacy (RA) could be "counted" based on how intermittent resources and demand response are counted for RA purposes according to the CPUC's Phase 1 RA decision and the proposed Phase 2 RA decision [in the CPUC calendar for decision this week.].

- For intermittent resources such as solar and wind – average of MW, 12-6 pm weekdays, excluding holidays for each month.
- Demand response - sustained reductions in MW level for at least 4 hours per day, 3 days per month for 4 summer months (48 hours per summer season). Use historical load reduction and find lowest demand reductions we can sustain for 4-hour blocks (between noon and 6pm) across 3 days per month. Days do not need to be consecutive.

Jeff Hirsh also provided a description of how peak kW is calculated in DEER.

- For residential weather –sensitive measures, the normal process is to use 2-5pm during the worst three-day weekday hot spell by climate zone. The peak kW is the average over the nine hours. For residential, because of equipment cycling, the average is not calculated over nine hours, but over the actual run time of the device during the nine hour period. For non-weather-sensitive measures, a single hour energy differential value is used, adjusted for diversity.
- For non-residential buildings, DEER averages simulation results over a group of buildings to arrive at diversified impacts. The hot spell period is used for non-residential, except for educational buildings.

- For educational buildings, if the hot spell occurs during the summer break, the next highest hot spell period is used.

Jeff stressed that the DEER team has the simulation tool available to re-calculate peak kW that conforms to a new definition.

### 3.3 Counting Peak kW

Even if a consistent metric can be developed for reporting peak kW, there remains the question of what number to report when reporting annual peak kW reductions. There are four ways to interpret “annual peak kW reductions.”

1. Reductions associated with measures installed in any given year
2. Reductions associated with measures installed during the program cycle by the summer season in any given year.
3. Reductions associated with measures installed during the program cycle and still operational by the summer season in any given year.
4. Reductions associated with measures that are installed because of program efforts undertaken in the program cycle but which may not actually be installed until a later year.

Using the figure below, one can see how “peak kW reductions” can vary depending upon how one interprets “annual peak kW reductions.” The figure shows the peak kW impacts for 9 hypothetical measures. For each measure, the kW reduction associated with the measure is placed in the table starting with the installation date of the measure, and continuing until the end of the measure’s useful life. For simplicity, the kW reductions are assumed to be already adjusted for the net-to-gross ratios, and the kW reductions are assumed to be constant throughout the year.

Figure 1: Illustrative Peak Reductions by Quarter

kW Reduction	2006				2007				2008				2009				2010				2011				2012				2013			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Measure 1	2	2	2	2	2	2	2	2																								
Measure 2		2	2	2	2	2	2	2	2	2																						
Measure 3			2	2	2	2	2	2	2	2	2	2	2	2	2	2																
Measure 4				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3												
Measure 5					3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3								
Measure 6						3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3				
Measure 7							4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Measure 8								4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Measure 9									4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Total	27	6	6	8	11	11	11	13	14	18	16	16	19	19	19	17	17	17	17	14	18	18	18	18	15	15	15	15	12	12	12	12

Alternative types of annual peak reductions are shown in the Table below for year 2008.

Table 1: Four Types of Annual Peak kW Reduction Valuations for 2008

Description	Peak kW	Discussion
1. Installed in the year 2008	7	Measures 5 and 8 are installed in 2008.
2. Installed during the program	20	Measures 1,2,3,4,5,7, and 8 are installed by the



cycle (2006-2008) by the summer season (Q3 2008)		Summer season (Q3 2008).
3. Installed during the program cycle (2006-2008) and still operational by the summer season (Q3 2008)	16	Measures 3,4,5,7, and 8 are installed by the summer season (Q3 2008).  Does not include measures 1 and 2 as their useful lives have been reached prior to summer season (Q3 2008).
4. All units installed because of efforts undertaken in the 3-year program cycle	27	Includes all measures, even though 6 and 9 are not installed until after the end of the program cycle (2008).

Parties were concerned that numbers reported for energy efficiency purposes could be misinterpreted in other venues such as in resource planning applications. In Figure 1, one could report that this illustrative program would provide 27 kW of peak kW reductions, yet the largest system reduction that would be realized in any quarter would be only 19kW. Parties agreed that it is important to show the kW reduction for measures installed in each year (type 1) for tracking the attainment of annual program goals, i.e. showing what was “sown”. Parties also agreed that it is important to forecast kW for measures installed during the program cycle and still operational in the summer of each year (type 3) for resource planning purposes, i.e. showing what will be “harvested” taking into account the temporal nature of the installations. The E3 calculator was revised to report both type 1 and type 3 values.

#### **Timing of Installations (Program Cost-Effectiveness versus Goal Achievements)**

Another counting issue is whether to count installations that occur as a result of efforts in the program cycle, but are not forecasted to be in place until after the end of the program cycle. This is a common occurrence with new construction programs. In the Figure 1 example, 7kW (Measures 6 & 9) of the total 27kW is forecasted to occur after the end of the three year program cycle (2006-2008). PG&E and SCE's view is that if program funds are being used to achieve those future installations, then the benefits of those installations should be included in the cost effectiveness test calculations. SDG&E/SoCalGas consider the inclusion of installations past the program cycle to be inconsistent with Energy Efficiency policy. The resolution was to modify the E3 calculator to report kW, kWh, and therm reductions separately for measures installed in 2006-2008 and 2009-2012.

### **3.4 Standard Practice Manual Consistency**

The TecMarketWorks report asserted that there was an error in the E3 calculator because the TRC benefit cost ratio could exceed the PAC benefit cost ratio when the program incentive costs equaled or exceeded the cost of the measure. Parties agreed that this is not an error in the E3 calculator, but rather an issue with how costs are defined in direct installation-type programs. The Energy Division expressed concern that the past practice was to only classify cash payments as incentive transfer payments, and that including direct installation costs as a transfer payment would provide parties with a means to game the TRC benefit cost ratios. The IOUs, however, pointed out that direct installation labor and materials have historically been treated as

"incentives" (transfer payments) in both the TRC and PAC cost-effectiveness calculations. The IOUs stated that if there are clear definitions for costs that are considered transfer payments, the opportunity to game those costs will be mitigated. The utilities also pointed out that the programs need to pass the PAC test as well as the TRC test, and those direct install costs would appear as a cost in the PAC test. ALJ Gottstein directed the IOUs and Energy Division to hold further discussions to resolve the Energy Division's concerns about the classification of incentives, but those discussions did not occur in time for inclusion in this report.

The E3 calculator does contain an inconsistency with the Standard Practice Manual, with respect to its treatment of usage increases (as opposed to reductions). The calculator treats any increases as a negative benefit, rather than as a positive cost, as specified in the Standard Practice Manual. E3 provided algebraic proof that this nonconformance would never change the benefit cost ratio unity relationship of a program. In other words, a program's benefit cost ratio would never flip from less than one to greater than one or vice versa because of the classification of an impact as a negative benefit or positive cost. No party expressed concern over this nonconformance, and it was pointed out that the current cost-effectiveness workbooks contain this same nonconformance. Parties agreed that this non-conformance does not need to be fixed.

### **3.5 Installation Schedules**

PG&E's E3 calculator requires users to forecast installations on a quarterly basis. SDG&E and SoCalGas E3 calculators require annual installation, which are then apportioned equally to each quarter in the corresponding year. SCE's E3 calculator required annual installations, and assumed that all measures were installed in the first quarter of the corresponding year. SCE agreed to use SDG&E's equal quarterly allocation method. PG&E continues to forecast installations on a quarterly basis.

### **3.6 End of Quarter Installation Convention**

The E3 calculator assumed that all installations were in place at the beginning of each quarter. E3 stated that it would be overly cumbersome to use a middle of quarter convention, but that an end of quarter convention could be used. PG&E ran numbers to see the effect of changing to an end of quarter convention, where measures are assumed to be in place at the end of the quarter for which they are entered. PG&E found that the difference is minor, on the order of a 1-2% difference. TURN, ORA, and Energy Division, however, believed that it made more intuitive sense to the user to assume the units are in place at the end of the quarter. Updated E3 calculators using the end of quarter convention have been distributed to each IOU.

### **3.7 DEER (User Entered) kW**

SDG&E's TOU load shapes and PG&E's residential TOU load shapes were developed such that the kW reductions are a function of the kWh reductions. This allows the E3 calculator to determine the benefits of the installed measures based solely on the annual kWh reductions --- no separate peak kW input is required. The peak kW reductions implied by the TOU shapes, however, could differ from the values contained in sources such as DEER.

To accommodate the potential discrepancy, SDG&E chose to require the user to input kW reduction estimates (from DEER or other sources) into the E3 calculator. The E3 calculator then determined kW reductions for reporting purposes based on these user-entered values. The user entered values were ONLY used for reporting kW reductions. All benefit cost calculations used the kW impacts derived from the TOU shape information. Parties expressed interest in the magnitude of the difference between the entered and implied kW values. That information was not available at the workshop, but E3 agreed to modify SDG&E's E3 calculator to show both the user entered and the shape-based kW reductions.

PG&E, on the other hand, chose to use the peak reductions implied by the TOU shapes for both kW reduction reporting and cost benefit calculations. (PG&E also reported CEC kW in its program filing, which is based solely on kWh reductions, and does not vary by measure impact shape). For consistency, PG&E agreed to conform to the SDG&E model and modify its calculators to show both the user-entered and the shape-based kW reductions.

There was no consensus in the workshop on whether the IOU's load shape-based kW values or the user--entered kW values should be used for reporting purposes.

### **3.8 Underlying Load Shape Display**

The E3 calculators contain pre-processed benefit information that reflects the combination of load shape information and hourly avoided cost information. The E3 calculator does not contain the source load shape information nor the source avoided cost information. Parties expressed a desire to see the load shape information, so E3 created separate load shape viewer files for each utility's load shapes. The PG&E files contained a drop-down list driven interface and graphical representations of the load shapes. TURN and ORA, who originally requested the files be included in the calculator were satisfied with the load shapes being provided on-line, but requested that drop-down list driven interface be added to the SDG&E and SCE files. The revised files were posted on E3's website on 10/27/2005. The URL address is [http://www.ethree.com/cpuc\\_cee\\_tools.html](http://www.ethree.com/cpuc_cee_tools.html)

### **3.9 Valuation of Savings during Critical Peak**

SDG&E stated that the issue of critical peak valuation originated with TURN and Proctor Engineering asserting that the utilities are not correctly valuing critical peak. SDG&E states that there are hourly avoided costs that value the critical peak, but that most utility load shapes are only at the TOU level. The lack of hourly load shapes dampens the valuation of the critical peak because those highest cost hours are essentially averaged with all the hours in the TOU period. SDG&E asserts that this is a TOU data limitation, not a problem with the methodology.

TURN basically agreed with SDG&E when it stated that it is more concerned about the use of TOU shapes than about the actual level of avoided costs in the critical peak period. However, TURN later asked if it would be possible to break out more of a critical peak price. E3 addressed this question with a presentation that summarized the ongoing work in the Title-24 building energy standards investigation into the valuation of demand response programs. This presentation described the CEC research effort to address the issue of more highly valuing the

critical peak period. E3 stressed that it was not proposing that this method necessarily be adopted for energy efficiency programs, but it seemed logical for workshop participants to be made aware of this closely related ongoing work.

### **3.10 Calculator Consistency**

ORA stated that it was originally interested in having all utilities use a common set of data (e.g.: end-use load shapes). Based on subsequent discussions in the workshops, however, ORA believes that common data may not be practical because of differences in inputs such as utility costs, peak periods, and load shapes. No party argued for consistent input data, but there would certainly be value to third parties if the E3 calculators for each IOU could be consistent. To improve consistency, E3 implemented numerous refinements, many of which are discussed in more detail elsewhere in this report. A brief list of the consistency changes is provided below.

- SCE installation schedule changed to spread installations to each quarter in the year.
- All installation schedules extend from 2006 through 2012.
- All calculators report impacts for measures installed in the calendar year, regardless of installation date within year.
- All calculators report impacts of measures installed and still operational as of the 3<sup>rd</sup> quarter of each year for summer peak kW impacts, and 4<sup>th</sup> quarter of each year for winter peak kW impacts.
- All calculators report both load shape based kW impacts and User-Entered kW impacts.
- All calculators require users to input peak kW reduction estimates for each measure based on DEER or other sources as appropriate, regardless of the measure end use shape.

## **4. E3 MODEL QUICK FIXES AND REFINEMENTS**

Another purpose of the workshop discussion will be to identify any E3 calculator (model or input) “fixes” that are relatively easy to implement and where there is general consensus that such modifications are appropriate. [D.05-09-043, p. 111] While the model changes are discussed in the body of the report above, the changes are summarized in the table below.

Table 2: E3 Calculator "Quick Fixes"

Item	Resolution
Report cumulative program impacts using installations times shape-based (estimated from hourly data or TOU shapes) and user-entered kW (The user-entered values will typically be DEER values, if available).	<p>Program (2006-2008) total annual kWh, kW, and therm reductions based on the calendar year that the measures are installed are shown on the OUTPUT tab in Rows 10 and 11</p> <p>User-entered kW values are shown in cells J10:J11</p>

	Cumulative results are shown for all units installed in 2006-2008, and 2009-2012.
Report annual impacts using installations times shape-based (estimated from hourly data or TOU shapes) and user-entered kW (The user entered values will typically be DEER values).	Annual program kWh, kW, and therm reductions for each calendar year that the measures are installed are shown on the OUTPUT tab in rows 58 through 64.  User entered kW values are shown in cells J58:J64.
Report the peak kW reductions for the total installations completed prior to, and still operational as of July 1st of each year.	See Table: <i>Persistent reduction in the summer (3<sup>rd</sup> Qtr) or winter (4<sup>th</sup> Qtr) of each year.</i> Cells C131:D138.
Use total installations 2006-2008 for the primary kW value for reporting purposes.	The value based on user entered (DEER) kW impacts (Output tab, Cell J10) is used in the Export tab cell B27. Note that the export section has been expanded to include both the Net Jul-Sept peak kW and the user-entered kW metric.
Change allocation of annual therm savings to use CO <sub>2</sub> as the basis (per Sempra calculator).	Formula modifications allow the gas savings per year to be calculated directly based on the measure installation schedule. The CO <sub>2</sub> proxy is no longer needed.
Modify calculator to accommodate cases where summer peak kW reduction is zero. This only affects the SCE and SoCalGas versions of the E3 calculator.	Pre-processors changed to accommodate these cases. The CostE data for SCE and SoCalGas have been updated. No changes to the E3 calculator formulae are needed.
Revise to accommodate decimal EULs	Present value formulae have been revised for the electricity and gas benefits as well as the customer bill savings. The new formulae perform present value calculations using the life of the measure truncated to the nearest quarter (year for the bill savings calculation*). The new formulae then take the present value for the first quarter (year) after the truncation point, and multiply it by the fraction of the measure life beyond the truncation point.  *Note: The bill savings calculation is used for the RIM test, which the IOUs are not required to report.
Modify calculator to end of quarter convention, using approximations as needed.	Measures are mapped to benefits streams that begin in the quarter following the installation of the measure. A measure implemented in

	Q2 of 2006, receives benefits starting on day 1 of Q3 2006.
Monitor issues of gaming inputs – <i>requires the IOUs resolve issue with the Energy Division</i>	
Produce load shape viewers for SCE and Sempra load shapes.	Done separately, and posted on E3’s website as of 10/27/05.
Allocate SCE annual implementations to equal quarterly implementations.	Treated the same as SDG&E. 25% of the annual implementations are allocated to each quarter in the year.
Allow installations for all IOUs through 2012.	Done to conform to SCE’s original E3 calculator.
Correct Gas Benefits calculation for measures installed after 3 <sup>rd</sup> Qtr 2008.	Prior calculator could underestimate gas benefits. Corrected as part of the Decimal EUL update.
Refine tracking of units with EULs of less than three years.	Formulae in the <i>InPlace</i> tab were revised to accommodate decimal EULs and track short-lived measures. The <i>InPlace</i> tab tracks the units that have been installed and are still operational each quarter.
Capacity Value Correction	The pre-processed benefits contained in the calculator inputs have been updated as discussed in section 4.3.

## 4.1 Other Structure and Interface Changes

### Structure Changes

(The user still only needs to enter data in the *Input* tab. These changes are listed for completeness, but do not affect the user)

- Moved the tracking of installations and effective useful lives (for monthly impact tracking purposes) from the bottom of the *Calculation* tab to a new tab, *InPlace*.
- Moved the monthly “coincident” peak, noncoincident peak, Monthly usage, Gas savings profile, and the calculation of the Avg Jul-Sept Peak, Avg Dec-Feb peak and NCP factors from the *Calculation* tab to a new tab, *Loads*.
- Added blank rows where needed so that all tabs that calculate values on a per-measure basis start with the first measure in row 17 to match the *Input* tab.

### Interface Changes

- *Measure End Use Shape* (INPUT Col F) label changed to *Measure Electric End Use Shape* for clarity.
- Measure Type Generic Life changes. Users can now enter one decimal place numeric values 0.1 through 18.0 or the integer values 19 or 20.

## 4.2 Treatment of Load Shapes not Currently in the E3 Calculator

Prior to and subsequent to the workshops, parties have raised the question of how to model measures that do not currently have suitable load shapes in the E3 calculator. For various reasons, the IOUs will not accept third party modifications to the E3 calculators. It is possible, however, to construct custom impact shapes using the existing shapes as a “workaround”. The following are two examples of the workaround that were discussed with the utilities subsequent to the workshop.

PG&E does not have an impact shape for reducing both air conditioning and electric resistance heating. To model the benefits of a measure, such as insulation, that would lower both cooling and heating load, the user could model the measure in two parts<sup>1</sup>. Assuming the first part is cooling, the user could select a cooling shape (such as 33 = *Res. Insul. Cen. A/C*) and input the cooling kWh reductions in one row of the INPUT tab of the E3 calculator. The user would then select a heating shape (such as 34 = *Res.. Insul. Cent. Heat*) and enter the heating savings in the next row of the INPUT tab. The caution is that the user should not double count any costs or incentives. Costs and incentive should be entered in ONLY one row (or they can be allocated between rows, but that might invite errors). Together, the benefits of the two rows would reflect the total benefit of the measure.

Another more complicated example is thermal energy storage (TES). In this case, the user would probably have to combine an HVAC shape with an off-peak shape such as outdoor lighting. The user would use the HVAC shape in the first row to model the summer on-peak kWh and kW savings from the TES measure. However, this would overestimate the reductions in the other time of use (TOU) periods. To correct for this, the user would use the outdoor lighting shape for the next row, and enter NEGATIVE kWh and kW reductions. The negative annual kWh and kW reductions would translate to load increases. The user would enter annual kWh and kW negative reductions (increases) that are sufficiently large such that the total kWh and kW reductions and increases for the two rows net to the actual TOU profile of the TES measure. Depending on the operating pattern of the measure, more than two shapes may be required to model the impacts accurately. As with the first example, care should be exercised to assure that costs and incentives are not double counted.

All of the utility end use and impact shapes contained in the E3 calculators are on E3’s website: [http://www.ethree.com/cpuc\\_cee\\_tools.html](http://www.ethree.com/cpuc_cee_tools.html)

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<sup>1</sup> Note that the benefits would not include transmission and distribution (T&D) capacity avoided costs for winter peak reductions. All T&D capacity values in the CPUC-adopted avoided costs are allocated to the summer season. T&D capacity avoided costs are allocated to the summer for all areas because the summer season is the dominant driver of capacity needs in each of the utility costing areas presented in the CPUC adopted energy efficiency avoided costs. There is currently no process in place to accommodate sub areas that may differ from the broader costing areas and peak in the winter season. The winter reductions, however, would be credited with the kWh-based benefits such as generation energy and emission

### **4.3     Avoided Cost Correction**

During the calculator updating process, E3 discovered an error in the transmission and distribution avoided capacity cost tables used as inputs to the E3 calculator. The tables resulted in overestimates of electric benefits, especially for those end use and impact shapes that had relatively high summer peak kW reductions. It should be noted that this error does not impact the savings calculations nor the levelized program costs, although it does mean that programs with benefit cost ratios may merit additional review. This error has been corrected.

## **5.     PRELIMINARY LIST OF ISSUES FOR THE FEBRUARY UPDATING PROCESS**

### **5.1     Measure Load Shapes**

As discussed in Section 3.1, *Available Load Information*, parties recognized that available load shape data are not currently at the same level of precision as the avoided cost information. Moreover, some of the measure load shapes are decidedly dated, and there is an interest in developing more timely and detailed load shapes.

DEER was discussed as an option to draw data from and which has the capability to produce hourly energy, demand or impact shapes, although it also has limitations. Careful decisions will be required to prevent the evaluation process from becoming overwhelmed by data.

For example, Jeff Hirsh described numerous resolutions for estimating impacts and demonstrated that DEER can produce information at 15 minute or five minute resolutions. The avoided cost values, on the other hand, are hourly data. Also, the various combinations of climate zones, building types, vintages, and building orientations can result in scores of permutations for the same energy efficiency measure. Parties pointed out the importance to consider the availability of existing data and value of the additional computations against the incremental benefits to be gained.

With the DEER simulations also comes the issue of calibration. The DEER simulations reflect expected impacts based on computer building energy models, but the results need to be calibrated to actual utility impacts. Parties cautioned that model results can overestimate actual impacts, and that the accuracy of simulated models versus load research data needs to be considered. Lastly, there are also issues regarding how load diversity is treated in DEER.

Issues for further consideration include:

- Where to get better data
- Improvements to the consistency in underlying load shape data and the methods by which that data is translated into peak savings estimates.
- Specifications for the type of load shapes to be developed
- Period for defining demand impacts (e.g.: 5-minute, 15-minute, run time averages)
- Calibration of results to annual usage and end-use survey data



- Management of data options (how to meaningfully distill down hundreds of simulation options per measure)
- How demand will be measured ex-post

## 5.2 Definition of the Peak kW

As discussed in section 3.2 *Peak kW Definition*, the peak kW metrics used in the current E3 calculator are limited by the available measure impact data. Moving forward, however, as better data becomes available, it may become possible to define peak kW and other load reduction metrics that would be useful for numerous applications in addition to energy efficiency goal reporting and tracking. The October workshops touched upon some of these applications, such as resource adequacy, and critical peak pricing. Questions were also raised regarding whether it is sufficient for a peak kW measure to reflect *expected* reductions, or whether in some cases the peak kW metric should reflect *dependable* reductions. Whereas expected values are adequate for determining value in an energy market, dependable reductions may be appropriate for determining capacity market value or resource adequacy value.

## 5.3 Avoided Cost Valuation

Parties questioned whether the avoided cost values are high enough to reflect the value of peak reductions during the few (less than 200 hours) highest value hours in a year. E3 stated in its avoided cost report that the hourly avoided costs were appropriate for energy efficiency programs, but may underestimate the value of resources with limited hours of operation, such as demand response programs or critical peak pricing programs. The Decision suggested using the CPUC-adopted avoided cost information as a starting point for refinements to the highest value hours in a year. E3 recommends that parties consider the SCE –sponsored work for the CEC in the Title 24 building energy standards valuation of demand response programs. That work also builds upon the CPUC hourly avoided costs and adds an additional capacity value to the top hours of the year that reflects the cost to attract new capacity, adjusting for the profits that can be secured in the energy markets.

PG&E also suggested that all capacity value be removed from the hourly generation energy costs, and treated as a separate capacity component. This approach was rejected as unnecessary for the energy efficiency avoided costs adopted in April 2005, but PG&E has indicated that it would like to revisit the issue.

Lastly, a comment was made regarding whether further refinements to avoided cost values would be necessary to distinguish between the value of energy efficiency measures that are fully dispatchable and therefore provide an option value, versus those that are not fully dispatchable.

## 5.4 Future Calculators or Models

Going forward, there is a question about the most appropriate calculation platform to use for the program evaluations. The E3 calculator is Excel-based, and approaching size limitations. The SCE calculator, for example, is about 30MB in size. Database options were briefly mentioned,

but ORA also stressed that it is looking for transparency like that provided by the use of spreadsheets. At a minimum, ORA urged that any model be replicable through spreadsheets. Parties also stressed that a new model platform would not solve the underlying problem that better data simply is not available currently. Any decision on model migration would depend upon the decisions made regarding the data that would be developed for future evaluations.

**6. FUNDING OF WORKSHOPS CALCULATOR REVISIONS AND WORK LEADING TO THE FEBRUARY UPDATE**

D.05-09-043 Ordering Paragraph 15 orders the utilities to contract with the appropriate expertise to update the current avoided costs and refine the E3 calculator model in consultation with the Energy Division staff. Furthermore, the costs of this contract shall be paid for out of the utilities' portion of the 2006-2008 EM&V budget. PG&E, SDG&E, SoCalGas and SCE, in consultation with the Energy Division have agreed to maintain E3's services to ensure that the work is done expeditiously. As directed, the utilities will pay for E3 services from the 2006-2008 EM&V budgets.

Respectfully Submitted,

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Dated: November 1, 2005

CERTIFICATE OF SERVICE BY ELECTRONIC MAIL OR U.S. MAIL

I, the undersigned, state that I am a citizen of the United States and am employed in the City and County of San Francisco; that I am over the age of eighteen (18) years and not a party to the within cause; and that my business address is Pacific Gas and Electric Company, Law Department B30A, 77 Beale Street, San Francisco, CA 94105.

I am readily familiar with the business practice of Pacific Gas and Electric Company for collection and processing of correspondence for mailing with the United States Postal Service. In the ordinary course of business, correspondence is deposited with the United States Postal Service the same day it is submitted for mailing.

On the 1<sup>st</sup> day of November 2005, I served a true copy of:

**JOINT UTILITY REPORT SUMMARIZING WORKSHOPS  
ON AVOIDED COSTS INPUTS AND THE E3 CALCULATOR**

[ X ] By Electronic Mail – serving the enclosed via e-mail transmission to each of the parties listed on the official service list for R.01-08-028 and A.05-06-004 with an e-mail address.

[ X ] By U.S. Mail – by placing the enclosed for collection and mailing, in the course of ordinary business practice, with other correspondence of Pacific Gas and Electric Company, enclosed in a sealed envelope, with postage fully prepaid, addressed to all parties on the official service list for R.01-08-028 and A.05-06-004 without an e-mail address.

I certify and declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on this 1<sup>st</sup> day of November 2005 at San Francisco, California.

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PATRICIA A. KOKASON